

Listing of Claims

Claims 1-10 (canceled)

11. (original) An optical pickup apparatus, comprising:  
a semiconductor laser and at least one light-receiving element  
formed in a single stem and positioned such that said  
semiconductor laser emits light ray flux along a first  
optical path through an objective lens onto an optical  
recording medium in a form of a small spot to facilitate  
operation of recording, reproducing and/or erasing of  
optical information, and such that said at least one light-  
receiving element receives light from a second optical path  
that is at least partially different from said first  
optical path; and  
a uniaxial crystal plate having a discontinuous surface and being  
disposed in said first optical path between said  
semiconductor laser and the objective lens;  
wherein said light ray flux emitted from said semiconductor laser  
is transmitted along said first optical path through said  
uniaxial crystal plate to said objective lens for focusing  
on the optical recording medium; and  
wherein light ray flux reflected from the optical recording  
medium is transmitted through said uniaxial crystal plate  
and along said second optical path to said at least one  
light-receiving element.

12. (original) An optical pickup apparatus as defined in claim 11, wherein a uniaxial crystal plate is hermetically sealed unitarily in a package containing said semiconductor laser and said at least one light-receiving element therein.

13. (original) An optical pickup apparatus as defined in claim 11, wherein said at least one light-receiving element formed on said stem consists of two pieces of two-divisional light-receiving elements respectively having dividing directions different from each other, and a height of one of said light-receiving elements is the same as a height of said semiconductor laser, while a height of another one of said light-receiving elements is different from said height of said semiconductor laser.

14. (original) An optical pickup apparatus as defined in claim 11, wherein a uniaxial crystal plate is hermetically sealed unitarily in a package containing said semiconductor laser and said light-receiving element therein.

Claims 15-28 (canceled)

29. (previously presented) An optical disc apparatus comprising:

a light source;

an objective lens for focusing light ray flux emitted from the light source on an optical recording medium;

a quarter-wave plate located between the light source and the

optical recording medium;  
a flux separating element configured to separate light rays  
reflected on the optical recording medium from an optical  
axis of incident light rays, the flux separating element  
including a uniaxial crystal with a discontinuous surface  
disposed in an optical path between the light source and  
the objective lens; and  
a light-receiving element positioned adjacent the light source  
and at a front side thereof for detecting a signal from the  
reflection light rays.

30. (previously presented) The optical disc apparatus of claim  
29, further comprising a collimator lens located between the flux  
separating element and the optical recording medium.

31. (previously presented) The optical disc apparatus of claim  
29, wherein the light source is at a different height from that of the  
light-receiving element.

32. (previously presented) The optical disc apparatus of claim  
29, wherein the flux separating element comprises a prism including the  
uniaxial crystal disposed in the optical path between the light source  
and the objective lens.

33. (previously presented) The optical disc apparatus of claim  
29, wherein the optical disc apparatus is an optical pickup.

34. (previously presented) An optical disc system comprising the optical disc apparatus as defined in claim 29.

35. (previously presented) The optical disc apparatus of claim 29, wherein the light source is a semiconductor laser.

36. (previously presented) The optical disc apparatus of claim 29, wherein an incident plain surface of the flux separating element is not perpendicular to the optical axis.

37. (previously presented) The optical disc apparatus of claim 29, wherein the light source and the light-receiving element are unitarily constructed by combining both of them into one.

38. (previously presented) The optical disc apparatus of claim 29, wherein the flux separating element is employed as a window member of the light source.

39. (previously presented) The optical disc apparatus of claim 29, wherein the light source, the light-receiving element, the flux separating element, the quarter-wave plate and the objective lens are mounted unitarily to form a unitary optical pickup portion.

40. (previously presented) The optical disc apparatus of claim 39, wherein the unitary optical pickup portion is accommodated in an actuator movable portion which can be moved both in a tracking direction and in a focusing direction.

41. (previously presented) The optical pickup apparatus of claim 29, wherein the light source, the light-receiving element, the flux separating element, the quarter-wave plate and the objective lens are accommodated in an actuator movable portion which can be moved both in a tracking direction and in a focusing direction.

42. (previously presented) An optical pickup apparatus comprising:

a light source;

an objective lens for focusing light ray flux emitted from the light source on an optical recording medium;

a quarter-wave plate located between the light source and the optical recording medium;

a flux separating element configured to separate light rays reflected on the optical recording medium from an optical axis of incident light rays, the flux separating element being disposed in a divergent optical path between the light source and the quarter-wave plate; and

a light-receiving element positioned adjacent the light source and at a front side thereof for detecting a signal from the reflection light rays, wherein the light source and the light-receiving element are formed in a single stem.

43. (previously presented) The optical pickup apparatus of claim 42, wherein two pieces of prism consisting of same sort of uniaxial crystal respectively having optical axes intersecting

perpendicularly to each other are employed as the flux separating element, such that when a refractive index for ordinary light rays of the prism  $\eta_o$  is larger than a refractive index for extraordinary light rays  $\eta_e$ , an incident angle of the ordinary light rays transmitted through the first prism to the second prism is  $\delta$ , and a counterclockwise angle from the optical axis of the ordinary light rays is in a plus (+) direction when the value of  $\delta$  becomes larger than zero, and such that when  $\eta_o$  is larger than  $\eta_e$ , an incident angle of the extraordinary light rays transmitted through the first prism to the second prism is  $\delta$ , and a counterclockwise angle from the optical axis of the extraordinary light rays is in a plus (+) direction when the value of  $\delta$  becomes smaller than zero ( $\delta < 0$ ).

44. (previously presented) The optical pickup apparatus of claim 42, wherein a plain plate made of birefringent material is employed as the flux separating element.

45. (previously presented) An optical pickup for use with a recording medium reflecting light flux incident thereon, comprising:  
a light source emitting light flux along an emitting direction;  
a focusing optical element;  
a flux separating optical element having a first side that faces the light source and through which light flux emitted from the light source along the emitting direction enters, and a second side through which the light flux exits the flux separating optical element, the flux separating element including a uniaxial crystal with a discontinuous surface

disposed in an optical path between the light source and the focusing optical element;  
a quarter-wave optical element through which the light flux from light source passes after having passed through the flux separating optical element, the focusing optical element focusing onto a recording medium the light flux from the light source after having passed through the flux separating and the quarter-wave optical elements;  
a reflected light flux detector facing the first side of the flux separating optical element,  
wherein the recording medium reflects the light flux focused thereon to thereby produce a reflected light flux,  
the reflected light flux passes through the focusing and the quarter-wave optical elements and enters the flux separating optical element through the second side thereof along an optical path that substantially coincides with a path of the light flux from the light source after exiting the second side and in traveling to the recording medium through the quarter-wave and focusing optical elements, and the reflected light flux detector receives, along a detecting direction, from the flux separating optical element reflected light flux that has entered through the second side.

46. (previously presented) The optical pickup of claim 45,  
wherein the emitting and detecting directions are at an oblique angle to each other.

47. (previously presented) The optical pickup of claim 45,  
wherein the light source and detector are spaced from each other in a  
direction transverse to both the emitting and the detecting directions.

48. (previously presented) The optical pickup of claim 45,  
wherein the flux separating optical element comprises a birefringent  
material.

49. (previously presented) A method of directing incident light  
onto a reflecting recording medium and detecting reflected light  
therefrom, comprising:

emitting light flux from a light source along an emitting  
direction;

causing the light flux emitted from the light source to pass  
through a flux separating optical element including a  
uniaxial crystal with a discontinuous surface disposed in  
an optical path between the light source and a focusing  
optical element, the light flux entering the flux  
separating optical element through a first side and exiting  
through a second side;

causing the light flux from the light source that has exited the  
flux separating optical element through the second side  
thereof to pass through a quarter-wave optical element;

causing the light flux from the light source that has passed  
through the quarter-wave optical element to pass through  
the focusing optical element and be focused onto a



recording medium that reflects the light flux focused thereon to thereby produce a reflected light flux,  
wherein the reflected light flux passes through the focusing and the quarter-wave optical elements and enters the flux separating optical element through the second side thereof along an optical path that substantially coincides with a path of the light flux from the light source after exiting the second side and in traveling to the recording medium through the quarter-wave and focusing optical elements, and the reflected light flux exits the flux separating optical element through the first side thereof and travels along a detecting direction to a light flux detecting element.

50. (previously presented) The method of claim 49, wherein the emitting and detecting directions are at an oblique angle to each other.

51. (previously presented) The method of claim 49, wherein the light source and detector are spaced from each other in a direction transverse to both the emitting and the detecting directions.

52. (previously presented) The method of claim 49, wherein causing the light flux from the light source to pass through a flux separating optical element includes passing the light flux through a birefringent material.